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ABSTRACT

This paper examines the interests, perceptions, and participation of 16 African American girls in a program designed to improve girls' persistence in science, mathematics, and technology (SMT). The girls are among 33 African American and 73 total original participants in "Rural and Urban Images: Voices of Girls in Science, Mathematics, and Technology," a project taking place in one urban county and one remote rural county in West Virginia. This paper focuses on the first year and a half of the 3-year project, which involves the same girls during grades 6-8. Project participants meet for monthly workshops, work with mentors from SMT careers in years 2 and 3, and meet with school sponsors and do community service in year 3. The project also works actively with parents and other advocates to provide information and strategies to encourage the girls in schooling and SMT studies. Retention in the program has been very high in the rural county for both African American and other participants, but has been less than 50 percent in the urban county. In separate sections, eight rural and nine urban African American girls in the project are described with regard to favorite pastimes, church activities, social skills, academic perceptions, heroes and role models, program attitudes, self-concept, career aspirations, and social interactions. This paper does not draw comparisons between the rural and urban girls nor focus on the factors placing many girls at risk, but rather, presents evidence that the girls are adopting new selves. An appendix describes the program. Contains 16 references (SV)

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SLEEPING BEAUTY REDEFINED: AFRICAN AMERICAN GIRLS IN TRANSITION

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Sleeping Beauty Redefined: African American Girls in Transition

"Woman kept her keys. She wouldn't trade for Man's Strength. So that's the way it is. Man is strong. But it's Woman who has the power."
(*Her Stories* by Virginia Hamilton, 1995, P.72)

Introduction

Middle or junior high school is a time of transition for all students. They are moving from childhood to adulthood. They are developing physically, emotionally, and mentally into the men and women they will become. A growing body of literature focuses on the special challenges or problems adolescent girls face in schooling and developing and maintaining their sense of self esteem (AAUW, 1990; Campbell, 1992; Hanson, 1993; Kahle, 1985; Orenstein, 1994). Factors affecting minority students' performance are also well documented (Clewell, 1992; Kuykendall, 1992; Oakes, 1990; Tobias, 1992). African American girls are at the intersection of both bodies of research, yet as a subpopulation we know little about the factors that contribute to their academic success or failure. African American adolescent girls are more likely than boys to be rebuffed by teachers and more likely to be ignored or disrespected by teachers and counselors. (Orenstein, 1994 and Pipher, 1995). African American women and women of color are also extremely underrepresented in science, mathematics, and technology (SMT) careers. This compelling data warrants further research.

In general, researchers have assumed that research on minorities and adolescent females has adequately addressed their concerns. There is a growing recognition of the need to look at data for girls of color and validate whether assumptions that hold for minorities and females overall hold for this subpopulation. (Campbell, 1996). This paper is one effort to bring together some of these bodies of research. It attempts to increase the dialogue concerning gender, ethnicity *and* SMT education. In addition, it adds to the limited knowledge on girls of color in SMT. Often research about girls of color focuses on their circumstances, rather than their character. This paper is intended to give voice to the girls' essence.

Data Collection

The 16 African American girls discussed in this paper are participating in a science, mathematics and technology program designed to improve girls' persistence in these areas. The project is titled *Rural and Urban Images: Voices of Girls in Science, Mathematics, and Technology or "Voices."* This paper focuses on the African American girls who have persisted throughout the one and a half years of the program's existence. Female data collectors interviewed each girl for approximately 30 minutes to an hour during the fall of 1995 and 1996. We conducted taped interviews at the girls' school sites. The interview protocol was loosely structured and informal. Interviewers used probing questions and asked the girls to talk about their interests, plans, self concept, perceptions of SMT and their academic abilities and social support networks. Eight of the 16 African American girls currently enrolled in the project attend an urban school. The other eight attend a rural school.

Background

Voice is a three-year project funded by the National Science Foundation. The program begins with sixth grade girls. The same girls participate in the program throughout their seventh and eighth grade years. Two counties in West Virginia, one urban and the other remote and rural, are hosts to the project. Of the projects' seventy-three original participants, thirty-three were African American. All of the African American girls attend schools where more than 90 percent of students are on free or reduced lunch. Three rural schools and three urban schools were involved in the project during its first year. During this second year of the project the three rural schools fed into two different middle schools. In the urban site the three urban elementary schools fed into one junior high school.

African Americans comprise a small percentage of West Virginia's total population. Sites were carefully selected to ensure that Voices would have a critical mass of African American girls. Girls of all ability and socioeconomic levels are in the project. Girls from the rural site were randomly selected and ethnicity was used to stratify the sample. The three urban schools had so

few sixth grade girls we invited all of them to participate. Teacher recommendations, grades, interest in science and mathematics were **not** used to select participants.

Project participants meet once a month for workshops in their respective counties during the school year. Besides the monthly workshops, the girls work with mentors from science, mathematics, and technology careers in years two and three of the project. They will also meet regularly with school sponsors and do community service in year three of the project. The project views family and community support as critical components of the girls' success. The project actively works with parents and other advocates to give them information and strategies to encourage their girls in schooling and SMT studies. Originally the project had 33 African American participants. Table 1 summarizes the enrollment data for the 95-96 school year and the Fall 96 semester. The table shows the largest difference in retention occurs between the rural and urban participants. Ethnicity does not appear to be a factor in retention.

Table 1.

Retention and Enrollment Data

	June 1996	January 31, 1997	Retention Percentage
URBAN Overall Total	37	17	45.9%
African American	21	9	42.8%
Non African American	16	8	50.%
RURAL Overall Total	36	29	80%
African American	12	8*	66%
Non African American	24	21**	87.5%

* Four students moved out of the county - when adjusted the percentage retained is 100%
**Two students moved out county - when adjusted the percentage retained is 91.3%

Retention Data

In the rural county Voices retention rates are high for both the African American and non African American girls. Some girls leave home as early as 6:00 a.m. Saturdays to catch a school bus that brings them to the workshops. No public transportation is available in the rural county and many families do not have cars. The county has several hollers and mountains and the girls are often geographically isolated from one another. Several of the African American girls mentioned "being with" or "seeing their friends" as reasons they enjoyed attending the Voices workshops. We have not needed to remove any girl from the project because of unexplained poor attendance. Only one girl, who was not an African American, elected to not continue in the project.

Getting consistent participation from all the girls in the urban site has been problematic. This year we began an attendance policy to try and develop consistency in participation. Girls who did not attend regularly and did not have valid reasons for being absent were removed from the project. The girls would indicate they were coming up to the day before the workshop and then not attend. Parents would also say that their daughters would attend and the girls would be absent. When we talked to the girls individually, they all expressed interest and stated they would attend future events; however, they did not. We primarily hold workshops at their school(s) and provide group transportation to any workshop not at the school. Many of the girls live within walking distance. Project staff could only surmise that the girls really were not interested in the project. We plan exit interviews with each girl dropped to try and determine why they elected not to continue their participation. Project staff acknowledge that the girls may not tell us why they chose not to participate. Finding strategies to increase retention in the urban site continues to be a challenge for project staff.

Retention data for the program is not only an indicator of the program's ability to engage the girls, but of the girls determination to persist. Saturdays are generally lazy days for adolescents. All of the girls who have given of their time for a year and half exhibit a valuable trait--persistence.

Who We Are

Rural

The eight rural African American girls all attend the same middle school. When asked to list two or three career choices they responded with teacher, nurse, doctor and lawyer. These are typically the professionals visible in the rural site. One girl expressed interest in being a cartoonist or police officer, another expressed interest in being an astronaut. We are examining whether Voices broadens the career aspirations of these girls.

Favorite Pastimes. The girls enjoy playing sports with basketball being the most frequently mentioned sport. A faded billboard on the main road proudly proclaims the area, "Basketball Capital of the U.S.." Many students dream of the NBA and basketball reigns supreme in the county. However, several girls mentioned playing football as an activity they do with friends and/or family and one girl mentioned playing midget league football on a team.

Two of the girls specifically talked about the fact that they were interested in boys. Most of the girls did not express an interest in boys to the interviewers. But, during project activities it is increasingly common to hear discussions of boys and relationships during breaks and other informal times.

Besides sports, the girls also listed reading as a favorite activity. Their reading materials of choice were mysteries, scary books, Babysitter serial books, and religious materials. A student who identified reading "funny books" as a hobby last year stated in her interview this year that she did not like reading. The interviewer wrote "[the student] does not like to read. She could not list any favorite books, but said she liked to read the magazine 'YM'." This shift in favorite activities bears closer examination because this student is an honor roll student who has expressed interest in

being a lawyer. She was a straight "A" student in sixth grade and stated in her interview this year that her strong point was "her grades and stuff." This student is self-conscious about her speech. Speaking is difficult for her.

Each year's interviewer commented that she seemed reluctant to talk and spoke so softly at times she could not be heard. Because she was so withdrawn, the interviewer during the fall of 95 questioned school staff about her stating she was a straight "A" student. The principal assured the interviewer however that the student was indeed extremely intelligent.

This example reinforces the need to assess academic ability in multiple ways. It also reinforces the need to provide students who are not middle class the tools they need-- career information, public speaking classes, additional enrichment experiences-- to be successful in meeting their career aspirations.

Church Activities and Social Skills. Participating in activities such as choirs, youth groups, and missionary teams seems to have helped the development of the girls' social skills and their ability to interact with adults in informal settings. All of the rural African American girls are involved in church activities and several are also involved in other organized activities such as recreational sports teams and 4-H Clubs. A recent study on African American student achievement in an urban setting noted that involvement in activities "such as the black church" was one of three important qualities influencing student success. (Sanders, 1996). This seems to be true in the rural setting as well. The rural girls are well mannered, warm, cooperative and inquisitive. Encouragement to take risks in workshops by experimenting and trying new things has lessened their reluctance to show what they think they can or cannot do. Two of the girls are clearly the "nurturers" within their groups, which often include non African American girls. They comb the other girls' hair, monitor their behavior and just generally keep themselves and their group in check.

Academic Perceptions. Most of the rural girls perceived themselves as good students and recognized the importance of college in fulfilling their career aspirations. During the fall of 95, one student described herself as a fair student. Another stated she was, "an average student in science and poor student in math." This year the interviewer asked how she would rate herself on a scale of 1 to 10 in math, science and computers. The interviewer noted, " She rates herself 10 as a student, math 9, science 9, computers 5. But overall she is better this year than last year because she has learned more new things, she has more confidence."

Heroes and Role Models. Seven of the girls stated that their mothers and/or grandmothers were either their heroes or the most important source of their support. The one exception was a girl who listed several male basketball players as her heroes in addition to her mother. The rural girls are involved with not only their nuclear family but their extended family members as well. Many girls listed babysitting relatives, playing with cousins or interacting with grandparents and aunts as typical daily activity. The caring and nurturing they receive from their families reflects their perceptions of what is important. When asked what they most liked about themselves, the girls said such things as "I'm nice," " I help others," " I'm happy and respectful". One girl said she liked the fact she could "do hair." Another with tongue in cheek stated "[her] oily skin." Several girls expressed a desire to be rich and purchase things for themselves and their families. Most of the girls come from homes where money is scarce. In fact the role model of one student was one of her classmates because, "she has 50 pairs of shoes, lots of clothes and her mother can replace anything that gets damaged."

The girls' favorite television viewing choices included Martin, Fresh Prince, and Saved by the Bell. Fox's "Martin" was the most frequently named program. Two of the girls stated that they either did not like TV or did not watch it very much. Only, two of the girls stated that they enjoyed watching music videos or listening to the radio. The images from these television programs do not seem to have a great influence on the girls' lives.

Voices. All of the girls expressed real pleasure with being in the Voices program. They were unanimous in identifying field trips as their favorite Voices activity; however, they also seemed to enjoy the school Saturday workshops. Field trips, especially the visit to the Challenger Center, in Wheeling, West Virginia was their favorite workshop. It was an overnight trip for the girls and they spent the night at a hotel and ate in restaurants. Several of the girls, both African American and non African American, had never been out of the county, spent the night in a hotel, or eaten in a restaurant. (Very few restaurants are in the rural county although fast food is available in the county seat.) Other favorite project activities were the Christmas Crafts workshop, making slime, working on the computer, and dinner at the advocate meetings (an expert country cook caters the meetings). One student when asked what she thought of Voices summed it up by saying "Voices is a great program because you get to do different things and they show you stuff."

Overall the girls have positive self concepts. However, a need for a project like Voices exists. Half of the girls verbalized that they felt males are innately better in mathematics or science. When asked why they thought more males were in these areas they said such things as, "boys understand science better"; "men like technology, they can do experiments ; women are interested in technology, they would rather teach"; "boys know more about math." Most importantly, when asked to describe what someone who is good in mathematics and science looks like, none of the girls described themselves or any other African American female.

Urban

All of the urban girls attend the same junior high school. This school has more than 600 students and offers many clubs and other activities. Many of these activities occur during the school day. The atmosphere in the school is one of "extreme busyness". Teachers and administrators are always on the run. A visitor can often stand in the front office and never be noticed. At the school students are not tracked and there are two advanced seventh grade courses ----honors English and pre-algebra. Only one of the African American Voices' girls is enrolled in either of these courses although there are other African American students in them.

Career Aspirations. Most of the girls interviewed during the fall of 96 stated they wanted to go to college and connected achieving their career goals with attending college. One student when asked if there was a college she wanted to attend stated, "One, I don't know where it is, Harvard." Career choices for the African American girls were doctor, day care worker, teacher, lawyer, model, astronaut and paramedic. Two students stated they selected careers based on what they saw on television. " ER" had influenced one girl to become a doctor. " 911" influenced another to be a paramedic. These are careers that were familiar to the girls because of television or personal experience. They will participate in the mentoring component of Voices where several female engineers, two of whom are African American, are mentors. It will be interesting to see if this exposure causes some of the girls' to consider engineering as a career option. Although their career aspirations are high, many of the girls' career goals have been marginalized by school staff. The principal stated to a Voices' staff member that "what those girls really need is a self esteem program." In his opinion, "[Voices staff] are setting them up for failure" by letting them believe they can pursue careers in SMT.

Pastimes. The girls participate in a variety of sports. They are involved in baseball, track, basketball, football, swimming, skating and hockey. Watching the Dallas cowboys with her dad was a favorite pastime of one girl. The girl who wants to be an astronaut likes to play football, although her father disapproves. The interviewer wrote, "[student] likes to play football. Can't play when her Dad is home because he says that's a man's sport. So when she plays the have lookouts. If he comes around, they act like they're cheerleading." Two of the girls mentioned dancing and watching videos as favorite activities.

Most of the girls stated they enjoyed reading. At least six girls mentioned it as a favorite pastime. Favorite reading materials included Goose Bumps serial books and mysteries. Three girls, all from the same elementary school, stated they had an interest in Black History and reading about African Americans. These girls had an African American social studies teacher who was the school's Voices' sponsor. The librarian at their school, who was not African American, purchased

books on African American historical figures, children and families during the school's book fairs. These types of books were also a part of the school's library collection. One student, from a different elementary school, liked reading so much she stated she had read every book in her house and needed to purchase some new ones. In contrast to the opportunities afforded her friends in the other school, she never went to the library due to her intense dislike of the school's librarian.

Only two students stated they did not like reading. One of these students is enrolled in "special education" courses. The other student who did not like reading stated she did enjoy reading about Dr. Martin L. King. She bragged that she had read so much about him that she probably knew things about him, "even his daughters don't know."

Only one girl did not indicate that watching television was a favorite pastime. Fox's Martin was the most frequently watched program. Several students mentioned that they watch New York Undercover. Only one student stated she watched Cinemax and HBO. Other favorite programs of the girls were "Sister, Sister"; "Comic View"; "Video Soul"; "Rug Rats"; and " Are You Afraid of the Dark?". The television shows appear to have varying degrees of impact on the girls. One of the student's speech, dress, and mannerisms are greatly influenced by "Video Soul" images. She leads the raps with several of her friends, uses the arm mannerisms of rappers and speaks in slang. She is "the bomb." (an African American slang which loosely means the greatest, most explosive thing around). Another girl stated her heroes were "Whitney Houston because she's pretty and sings good and Tyra Banks because she's tall, beautiful and a model." Three students stated that their heroes were their moms, one student stated her mom and grandma. The only other family member mentioned by a girl was her half sister. When asked why she was her role model, the girl didn't know.

Self-Image. The girls are becoming conscious of how they look. A student who has done limited modeling stated her strongest assets were the fact that she was "nice to people and pretty," another stated that the thing she liked most about herself was her "good looks." This student however wanted to be known for being "smart." Another student commented that people often called her "Big Shirley" a character on the Fox's "Martin" television program. Nevertheless, size does not seem to be negatively related to her, or some of the other girls', self concept. In general, the girls appear to have a healthy acceptance of their appearance as young African American females.

However, a characteristic that was mentioned by several girls as something they would like to change was their " attitude." One of these girls is often referred to as someone with an "attitude". At least four of the girls said they needed to improve their attitudes. They recognized that they were negatively effecting them with their friends and in school. One of the girls who stated she needs to improve her "attitude" may be being judged based on her normal facial expression. She does not smile often without provocation, but when she is engaged in conversation with her peers or adults, her smile is infectious. She has a sweet character and a wonderful demeanor, except for not smiling. In fact, she was one of the few urban girls who socialized freely with the girls in the rural county.

Church Activities and Social Skills. Five of the nine girls stated they were currently or previously involved in church activities. Three of the five attend church regularly; one attends occasionally. These four girls get along well with the other girls and relate well to adults in informal settings. For example, one of these girls was so comfortable in her interview she stopped to tell the interviewer a joke, "Why did the skeleton cross the road? Because he didn't have the guts." These girls seem to float seamlessly between formal and informal settings.

The fifth girl was very involved in church during her sixth grade year and was secretary of her church youth group. However, her summer experiences seem to have changed her. As a seventh grader, she is no longer involved in church or any other organized activity outside school. She spent the summer with her mother in New York and now her idea of fun is "running the streets."

About half of the girls in the urban site do not have experiences outside school that give them an opportunity to develop additional social interaction skills and relate to adults in informal settings in an acceptable way. While they appear to negotiate school settings generally successfully, informal socialization skills are a missing key element. (None of the girls who have been discipline problem in project activities have been discipline problems in school this year.)

Social Interactions. The girls have divided informally into groups, not necessarily along racial lines. These groups have emerged during project activity and are dynamic in the sense that one girl may float between two groups whose general makeup remains the same. Overall the girls' in the urban site have behaved quite well. However, one group in particular seems to have bonded based on their desire to establish dominance within their smaller group.

A member of this group is known as "tough". Although these three girls voluntarily "hang with" each other, they often bicker back and forth. Two of them also playfully and not so

playfully kick, punch, and hit each other. They do not physically interact with the "tough" girl, but verbally challenge her. The three girls in this group also interact with other girls. When these girls "hang together" the other girls, both African American and non African American, ignore them.

All three of these girls, and another, had to be disciplined for unacceptable behavior during the first Voices' field trip of 1996. Voices girls from both counties were having a sleep over in a hands-on science museum. Two of the four girls exhibiting unacceptable behavior had been chronic discipline problems at their former school. However, they had never been discipline problems during project activities. The other two girls' involvement surprised staff. One was the girl who had been the secretary in her youth group. The other girl joined Voices late because she enrolled in school toward the end of sixth grade year. In her fall 96 interview she said "most everybody in the school knows me, [I] never get in trouble or fight anybody." However, based on an informal conversation with this girl, project staff were aware there might be some problems.

The four girls used profanity on the bus and would not respond to chaperone requests to turn their music down. They responded rudely to other chaperone requests (chaperones were not teachers), refused to participate in some planned activities, and wanted to be physically aggressive with some girls from the rural county. This group's behavior has tended to dominate how the urban girls were and are viewed. Several of the girls and adults in the rural site have commented on how "mean" the urban girls were.

Project staff dealt with the situation by counseling each girl individually, with their school counselor present, and sending a letter to their parents. Since that incident, one girl requested that we drop her from the project. The other three are still involved in the project. Of the three, only one is a discipline problem from time to time. She is also the girl who wants be known for being "smart".

Academic Perceptions. The African American girls perceptions in the urban site were greatly varied with regard to their academic abilities. Some girls expressed difficulty in mathematics. Typical of the comments reflecting their attitude toward mathematics were, "it's boring" and "It's hard and I don't understand it." Overall the girls not only do not like mathematics, they do not perceive that they can do well in mathematics. They frequently mentioned mathematics as "their worst subject." For example, when one student was asked to rate herself on a scale from 1 to 10 in the subject, she rated herself a 5.

Three students stated they did well in mathematics. However, one of these students still showed no enthusiasm for the subject. In her fall 95 interview, she stated she got the best grades in reading and mathematics (both As), however " [she] gets tired of math when they do so much of it" (worksheets). The other two students thought mathematics was fun, they did well. One stated she liked the teacher.

Science faired better among the girls. Most of the girls enjoyed doing science. They talked about looking through microscopes, mixing chemicals, and performing experiments. Whenever the girls were in a class where hands-on experiences were provided, they enjoyed science. When the girls were in science classes where they read and responded to questions most of the time, they stated that science was boring and they did not like it. Several girls stated that science was their best subject. Even though some of them did not like mathematics or did not receive good grades in the subject. It appears that what researchers have said about the effectiveness of hands-on science teaching with females is true for this group of girls.

The girls' assessment of their overall academic ability was very much consistent with their grades. They did not try to impress the interviewers by exaggerating how good their grades were. Often they were quite candid. The talked about failing subjects, being "below average" in subjects, and one student even told her interviewer her mother had her retained in fifth grade. She also stated she thought her mother decided correctly.

Voices. "It's chill" is the description one student gave of Voices. The girls seem to genuinely enjoy the field trips and the Saturday workshops. The only negative comment ,echoed by almost every girl, was their dislike of getting up Saturday mornings. We hold the workshops at 9:00 a.m. When asked to name their favorite workshop most stated the visit to the Challenger Center. Because the girls in this county live closer to Wheeling, West Virginia their trip was only one day. They did not stay in a hotel, but seemed to enjoy the excitement of their space mission. Some samples of the comments are, "the workshops are interesting"; "we learn things"; "I'm sorry I missed the robot workshop"; "it's fun." When the interviewer asked one student about Voices she began, "I had won this little trophy. I think I was the only person to show up for all of the workshops. I showed up for every last workshop they had. It was nice. I was excited for that." She continued when asked about her overall opinion of Voices by saying, "It's fun, if you want to get into it. But if you're like, 'see, I don't want to get into it', it'll seem boring to you."

Voices is clearly fulfilling a need. The pipeline for African American females into SAT careers is still not well established. Overall, African Americans hold 2.6% of the science and

engineering jobs even though they are 10% of the total workforce. (Clewell, 1992 p.4) The Voices program provides an opportunity for these girls to explore new career options and see how SMT is used in the real world. Only one of the African American girls has a parent who is involved in a SMT career. Although several girls have computers at home, none of them mentioned using E-mail or the Internet. Voices provides an opportunity for them to use this technology. Equally important, is the opportunity the project provides for social interaction with adults and mentors. Hopefully, these experiences will positively impact the girls who lack other opportunities for informal interactions with adults.

Final Reflections

This paper does not draw comparisons between the African American girls in the rural site and those in the urban site. Comparing children may breed dissatisfaction and attempts to mold one into another. The project wishes to recognize the differences each girl brings to SMT and to nurture this individuality. The Voices project is being conducted to learn how to structure SMT education to capitalize on these differences.

This paper does not focus on the factors that place many of these girls at-risk. Instead it focuses on the girls' lives, hopes, dreams and perceptions of themselves. Their lives, like ours are not perfect. Many of these girls contend with poverty, neglect and abuse by parents, limited opportunities for enrichment outside formal schooling, violence in their home environments and indifferent and hostile teachers. Since the Voices project has begun, we have already lost girls to one or more of these. Before the project's conclusion we may lose more.

The question for us as educators and caring adults is how we maximize the chances of these girls and others like them attaining their goals. None of our girls aspired to be an unwed mother, a drug addict, or a permanent welfare recipient.

We have seen evidence through these girls' voices that they are adopting new selves. The changes, can be dramatic, yet their essence is still there. Eventually they will decide which self to embrace whether or not we intervene. How do we as a community of educators and caring adults create safety nets? How do we create structures within schools that allow girls' special needs to be heard, when there are so many competing voices? Do we abandon some of them because of their poverty, home environments, and behavior? Or do we help **all girls** cultivate their aspirations to be doctors, lawyers, astronauts, firefighters and cartoonists? The choice is ours to cultivate the beauty or let it become dormant and die.

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APPENDIX

Rural and Urban Images:
Voices of Girls in Science, Mathematics, and Technology

INTRODUCTION

Considerable research and program development on females in science, mathematics, and technology (SMT) has been devoted to interventions in suburban and urban environments; girls from rural environments are silent voices waiting to enter the dialogue. What engages rural girls in a pursuit of SMT education? Would the same interventions be effective in an urban environment? While the culture of science and science teaching is well recognized as a critical factor influencing participation, few programs have been designed to increase participation by addressing cultural aspects. This program, however, will reflect the environments in which it is implemented, and will be unique in addressing three major gaps in the present knowledge base:

- the effectiveness of support systems in increasing girls' persistence in SMT;
- the contrasts in effects of interventions in an urban and a rural setting; and
- the effectiveness of materials reflecting rural environments in teaching SMT content.

This program is experimental. It juxtaposes two environments—one urban, the other rural—in an intervention designed to recruit and retain middle school girls in SMT. Together, the two sites provide fertile ground for examining the effect of "place" on girls' lives and their relationships with SMT.

The program has three goals: (I) to have an impact on the infrastructure of SMT curriculum design by providing examples of materials and methods indigenous to rural environments and useful in SMT education; (2) to create advocates for the inclusion of girls in SMT education; and (3) to add to the knowledge base about rural and urban SMT education with respect to ethnicity and culture.

To reach the goals, we have four objectives: (1) to develop and test a strategy for constructing a social network made up of community members, family, and peers who advocate for and support girls' involvement in SMT; (2) to design materials and strategies that recruit and retain girls in SMT; (3) to conduct an ethnographic study that examines how girls, guardians, and teachers perceive the role of girls in SMT; and (4) to produce one or more documentaries to demonstrate (a) the social contexts in which rural and urban girls interact with SMT education, (b) barriers to their full participation, and (c) changes over time when systems exist to support and validate their worth and competency in SMT.

An examination of the intersection of girls and culture is critical to understanding the participation of girls in SMT. To effectively communicate these dynamics, we must give vision and voice to the girls in the project. Although the project will be implemented in only two sites, the resulting documentary, ethnographic study, and materials will greatly magnify its impact. As we examine the support mechanisms that must be in place and the types of materials and strategies that engage these communities, we will increase our understanding of how to systematically acculturate girls into SMT.

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Program Content

	Focus of Monthly Saturday Sessions		Additional Activities	Key Players
YEAR 1	September	Kickoff-collaborative learning, exercises/team building/explain program.	• Orientation—with parents, advocates, coordinator, invited community members and teachers. Meeting will include a hands-on science activity that teams girls, guardians, and advocates to perform an experiment. • Fall meeting: Telling stories about girls' strengths and interests. Value of parents' information to teachers will be highlighted. Hands-on group activity. • Winter meeting: Raising awareness of gender issue in SMT as they affect learning and course selection. Hands-on activity. • Spring meeting: Role playing to practice acting as a partner in school conferences. Hands-on activity. • Year-end meeting: Exhibition	• 6th grade girls • Guardians/ advocates • Coordinators • Workshop presenters
	Mid-October	Challenger orientation.		
	November	Challenger visit.		
	December	Teaching fractions through crafts.		
	January	Chemistry of folklore remedies.		
	February	Designing quilt patterns on computer.		
	March	Analyzing the Southern diet.		
	April	Chemistry of food preservation.		
	May	Preparing for the exhibit.		
	June	Exhibition.		
YEAR 2	September	Bluefield Science Center visit.	• Kickoff (hands-on activity). • Fall meeting: Parents/advocates. • Spring meeting: Awareness of careers in SMT and course requirements to prepare for them. Presentations by WVU's Health Science and Technology Academy. (11th graders in Kanawha and McDowell Counties.) Hands-on activity. • Year-end meeting: Exhibition	• 7th grade girls • Guardians/ advocates • Science, mathematics, and engineering mentors • Coordinators • Women scientist presenters
	October	Expanding Your Horizons Conference		
	November	Build Robots.		
	December	Robots continued.		
	January	World Wide Web training.		
	February	World Wide Web training (cont'd)		
	March	Lifestyle survey.		
	April	Exhibition Preparation		
	May	Exhibition		
	Summer Trip	To be announced		
YEAR 3	September	Virtual scientist kick-off. Distribute book.	• Kick-off—Hands-on activities for parents. • Fall meeting: Problems and promises—How puberty silences girls. Parents write (or tape) letters to their daughters: "My dream for you is..." • Spring meeting: Making connections—Letters written by mentors about girls' strengths and achievements are shared with parents. • Exhibition	• 8th grade girls • Guardians/ advocates • Coordinators • Elementary students • Mentors
	October	Hydraulics tour		
	November	Book discussion/original sequel		
	December	Completion of original sequels		
	January	Mentor/girl presentation planning		
	February	Mentor/girl presentation planning		
	March	Community service		
	April	Community service		
	May	Debriefing on community service program/exhibition prep		
	June	Awards ceremony		